NAME OF THE COURSE	General Botany					
Code	PMB015	Year of study	1			
Course teacher	Professor Valerija Dunkić	Credits (ECTS)	7			
Associate teachers	Marija Nazlić, asisstant	Type of instruction (number of hours)	L	S	E	F
			45		30	
Status of the course	mandatory	Percentage of application of e-learning				

COURSE DESCRIPTION	
Course objectives	Acquisition of knowledge of plant cell structure and chemistry, ergastics, formation and role of vacuole, plastid and cell wall, morphological degrees of organization. Classify and explain the constituent and permanent plant tissues. Describe and explain the anatomyof vegetative organs: leaves, stems and roots. Analyze primary and secondary growt plants and differences in the anatomical structure of monocotyledons, dicotyledon, and gymnosperms. Describe changes in internal structure as a result of adaptation to specific living conditions. Morphology and adaptations of vegetative organs: stems, leaves and roots. Compare sexual and asexual reproduction. Analyze the developmental cycles of mosses an ferns. Explain the formation of generative organs of cormophytes: flower, inflorescence, and types of inflorescences. Pollination and fertilization. Development of seeds, fruits and types of fruits
Course enrolment requirements and entry competences required for the course	
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	After passing the exam, the student will be able to: 1. recognize the basic characteristics of a plant cell 2. recognize, in particular, the levels of organization in plants 3. know plant tissues - the role of structure and the role of stems, leaves and roots 4. know the characteristics of mosses, ferns and seedlings 5. know the importance of generative organs in the systematicsof cormophytes 6. identify and determine the characteristic species of the significant plant families
Course content broken down in detail by weekly class schedule (syllabus)	Lectures 1. Introduction. Plant cell. Ergastic formations: alkaloids, glycosides and tannins. Classification Botany. Form, characteristics and types of plant cells. Chemical and physical properties of plasma. Types of plasma movement. Importance of vacuole in plant cell. Reserve substances, excretory substances and vacuolar pigments. (3 hours) 2. Plastids. Cell wall: chloroplasts - photosynthesis. Photosynthetically active and inactive chromatophores. Structure, origin, types and hydrolysis of starch. Material and cellulose - structure of cell wall. Other parts of the wall - pectin, hemicellulose and chitin. Fine cell wall structure. Changes in cell walls: Lignification, suberinization, cutinization and mineralization. (3 hours) 3. Types of organization of talophytes and cormophytes: Morphological types of organization of cormophytes. Characteristics of Protophytes. Classifications and characteristics of talophytes: Aggregate sets, colony forms, polyenergetic insertions, filamentous algae and algae with true tissue. Organization of Cormophytes. (3 hours) 4. Formed tissue meristems: characteristics of meristem cells. Characteristics and location of primary meristems. Characteristics of the residual meristems. Significance of secondary meristems. (3 hours) 5. Basic and cutaneous tissues: characteristics of cells forming basic tissues. Forms of parenchyma. Significance and types of intercellulars between plant tissues. Characteristics of cells of cutaneous tissues. Epidermis and hypodermis and significance and types of separation. The occurrence of a cutinized layer and

	depression begins in xerophytes. Forms of hair cells on skin tissue. Periderm and rhizoderm. (3 hours) 6. Mechanical and conducting tissues: characteristics of cells constructing mechanical tissues. Types of collenchyma, sclerenchyma cells and sclerenchyma fibers. Obtaining paper from woody plants and natural tissues. Characteristics of cells that build conductive tissues. Phloem and xylem elements. (3 hours) 7. Types of vessels and storage tissues: Relationship of carpel and phloem in conducting vessels.Types of conducting vessels and vascular sheaths. Development of conducting vessels. Tissues for secretion and excretion: hydatodes, digestive glands. Formation and role of glandular cells and tissues and the types of chemicals they secrete. Laticiferes and storage tissues. (3 hours) 8. Leaf - Anatomy: arrangement of tissues in bifacial and unifacial plate. Significance of palisade and sponge parenchyma and veins in the leaf. Relationship between material and leaf function (Light leaves and shade leaves). (3 hours) 9. Leaf - morphological. Role of leaves in different plants: Formation and types of leaves. Morphological forms of leaf. Position of leaves on the stem and in the bud. Metamorphoses of leaves. Tissue relationship and characteristics in stem and base. Characteristics of xerophynous list. (3 hours) 10. Stem - anatomical: development and formation of stem tissue. Stem growth zones and tissue ratio in the formed primary structure of the tree. Types of secondary growth stems in thickness. Typical secondary structure of a woody stem. Primary and secondary growth of monocotyledonous stems. Characteristics stems of gymnosperms. (3 hours) 11. Stem - morphological. Root anatomical: types and location of buds on stem. Types of stems according to age, spread and arrangement of leaves and lateral branches. Orientation of stem to plane, and to divergence and angular divergence. Underground stem forms and life forms. Specifics of xerophytc stems. Primary root formation and structure. Anatomical principle of formation of secondary root (3 hours) 12. Root morphologically. Generative development: mosses and ferns: morphological characteristics and types of roots. Forms of reproduction in plants. Gametophyte i Sporophyte mosses, isosporic and heterosporic ferns. (3 hours) 13. Generative development of gymnosperms and angiosperms: Characteristics of gametophytesof gymnosperms. Generative organs of the angiosperms. Phylogeny of the flower of origin. The importance of the flower in systematcs, and a review of some features of single and double families. (3 hours) 14. Flower and types of inflorescences: Flower - flowers, andrecej and ginecej. Clusterad parsnip inflorescences. (3 hours) 15. Types of fruits: Types and modes of distribution of fruits. Single, cluster and collective fruits. Classification and characteristics of dried and juicy fruits. (3 hours) Exercises 1. Ergastic formations, starch and aleurone: preparation of preparations from aleurone beadsof castor bean, potato, wheat and corn and microscopic observation of similarities and differences in structure. (2 hours) 2. Tissue division, basic tissue and supporting tissue: making preparations from the leaves of the specie.Begonia, structure of parenchyma cells and angular collenchyma cells (2 hours) 3. Primary skin tissues: epidermal cells, various types of stomata, non-glandular trichomes: preparation and microscopic examination of Clivia nobilis leaves, Begonia, grass leaves, leaves of Verbascuma and Elaeagmus species. (2 hours) 4. Secondary vascular tissue, periderm components: phellogen, phellem, phelloderm, lenticels: preparation and microscopic examination of section through stem of Sambucus nigra. (2 hours)

	5. Conducting system of vascular plants: xylem and phloem: preparation and microscopic examination longitudinal section of trachea and tracheid and overview of cross section of sieve tube cell and a companion station. (2 hours) 6. Stem monocotyledonous and closed lateral vein: preparation of specimen an microscopic examination of cross section of corn stalk and observationof parts of epidermis, primary cortex and central cylinder, and especially examinationof veins. (2 hours) 7. Dicotyledonous stem and open lateral vein: preparation microscopic examination of cross-section of stem of dicotyledons and observationof parts of epidermis, primary bark and central cylinder, and especially examinationof veins with cambium (2 hours) 8. Transition from primary to secondary stem structure: preparation microscopic examination of cross-section of stem, with observation of interfascicular and fascicular cambium. (2 hours) 9. Secondary stem structure: preparation and microscopic examination of a cross-section of a linden stem with observation of cambium ring secondary bark, and secondary wood. (2 hours) 10. Bare stem wood structure: preparation and microscopic examinationof a transverse, longitudinal and tangential section of a pine stem, with observation of tracheds, and plasma and tracheal bands of the heart. (2 hours) 11. Primary root structure and polyarc radial vessel: preparation of specimens microscopic examination of transverse section through root of iis, and analysis of rhizoderm, primary cortex and central cylinder, with pericycle and alternate xylem and phloem. (2 hours) 12. Bifacial and equifacial leaf: Microscopic examination of cross section of leaf of olive with observation of peculiarity in the structure of leaf mesophylls and upper and loe epidermis. Microscopic examination of the cross section of a pine needle by observing the epidermis, hypodermis, assimilation parenchyma, endoderm veins. (2 hours) 13. Floral structure, morphology of monocotyledons: morphological representation of flowers and leaves of different species of monocotyledons. (2 hours) 14. Floral structure, morphology of dicotyledons: morphological representation of flowers and leaves of different species o dicotyledons. (2 hours) 15. Isosporic and heterosporic ferns: Morphological and anatomical study of leaves sporangia of ferns Scolopendrium vulgareae and Selaginella. (2 hours)					
Format of instruction	☒ lectures ☐ seminars and workshops ☒ exercises ☐ *on line* in entirety ☐ partial e-learning ☒ field work			☐ independent assignments ☐ multimedia ☒ laboratory ☐ work with mentor ☐ (other)		
Student responsibilities	Regular tracking of lectures and active participation in exercises. Obligatory participation in field teaching and production of herbars of at least 100 plants. Possibility of taking two partial courses during the course or final written exam. Orbital herbarium and theoretical part of the exam.					
Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is*	Class attendance		Research		Practical training	
	Experimental work		Report		Making and laying of hebrears	2
	Essay		Seminar essay		Done exercises	1
	Tests		Oral exam	2	(Other)	

equal to the ECTS value of the course)	Written exam	2	Project		(Other)	

Grading and evaluating student work in class and at the final exam	The exam consists of a written and oral part. The degree of the subject is divided into two units that the students submit through partial written exams or by completing the exam at the end of the semester. A written exam is deemed to be passed if the student achieves at least 60% of the total number of points. Scoring of written exam: <60% of students did not satisfy; 60-69% sufficient (2); 70-79% good (3); 80-89% very good (4); 90-100% excellent (5). After completing the written part and herbarium, the student gets the right to go to the oral exam. The final grade is based on the written and oral exam score.

Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	t. Nikolić: Morfologija bilja, Alfa, 2017	5	
	D. Denffer & H. Ziegler: Botanika (Morfologija i Fiziologija), Školska knjiga, Zagreb, 1982.	5	

Optional literature (at the time of submission of study programme proposal)	5 B. G. Bowes: Plant Structure, Manson Publishing Ltd, London, 1996 5 A. Fahn: Plant Anatomy, Pergamon Press, Oxford NewYork Toronto, Sydney, Pariz, Frankfurt, 1990
Quality assurance methods that ensure the acquisition of exit competences	The quality of teaching will be monitored by collecting feedback from students through consultations, discussions and questions that are raised during the course. At the end of the semester, the evaluation of subjects and teachers will be conducted through an anonymous student survey. The students' performance will be analyzed for the exam, and will be used for the purpose of improving the quality in the next academic year.
Other (as the proposer wishes to add)	